DOCUMENT RESUME

ED 234 071 TM 830 553

AUTHOR Hahn, Joan M.; Goldman, Susan R.
TITLE Children's Summarization Behaviors.
PUB DATE Apr 83
NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Association (67th, Montreal, Quebec, April 11-15, 1983).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Development; *Content Analysis; *Difficulty Level; Intermediate Grades; *Readability; Readability Formulas; Reading Comprehension; Reading Skills; *Skill Analysis
IDENTIFIERS Fry Readability Formula; *Reading Strategies; *Summarization

ABSTRACT

Developmental differences in summaries of expository texts were examined for fourth and sixth grade students in two experiments. Experiment 1 used texts that had a description content structure whereas Experiment 2 texts had a thesis/evidence content structure. Manipulation of the presence or absence of the topic sentence allowed the examination of the developmental relationship between selection and invention strategies. Processing demands were manipulated by readability level: each group received texts at and 2 years below their grade level, as measured by the Fry Readability formula. Each subject constructed summaries of three different lengths. In both experiments, differences between fourth and sixth graders' summaries were most apparent at the shorter summary lengths. Grade differences were larger when the topic sentences were not in the texts. The obtained pattern of effects is consistent with the notion that more sophisticated summarization strategies place greater information processing demands on children. (Author/PN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED234071

Children's Summarization Behaviors

Joan M. Hahn and Susan R. Goldman

University of California, Santa Barbara

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

S. R. Goldman

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Paper presented at the American Educational Research Association meetings, Montreal, Quebec, Canada, April, 1983.

TM 830 553

Abstract

Developmental differences in summaries of expository texts were examined for fourth and sixth grade students in two experiments. Experiment 1 used texts that had a description content structure whereas Experiment 2 texts had a thesis/evidence content structure. Within each experiment, whether or not the texts contained topic sentences and readability level of the texts were manipulated. Each subject constructed summaries of three different lengths. In both experiments, differences between fourth and sixth graders' summaries were most apparent at the shorter summary lengths. Grade differences were larger when the topic sentences were not in the texts. The obtained pattern of effects is consistent with the notion that more sophisticated summarization strategies place greater information processing demands on children.

Children's Summarization Behaviors

Joan Hahn and Susan R. Goldman

University of California, Santa Barbara

Throughout the school curriculum, students are asked to perform summarization tasks. Elementary students are often asked to "Find the main idea" or to "Write down the most important things from" a particular story or informational text. Junior high and high school students are given directives such as "Write a synopsis of" whatever material they have read. However, the procedures and guidelines for arriving at the required or targeted forms of summarization are essentially non-existent in the teaching manuals.

The manuals often refer to a taxonomy of comprehension or of thinking as the basis of including the task of summarization in lessons. As an example, the skill of summarizing may be referred to as a level of comprehension (Bloom, 1964), as organization of information (Guzak, 1977), or as a literal level of comprehension skill (Strang, 1974).

Current psychological literature supports the presence of the task of summarization in the curriculum and in taxonomies of comprehension. The formation of a summary from text information appears to be an effective learning strategy. Conclusions drawn from research dealing with summarization strategies include the following: (1) information reduced to a summary and stored in long termmemory is available for interaction with prior knowledge and for transfer to new learning situations (Kintsch, 1977); (b) The construction and retrieval of a summary requires a deeper level of processing than that necessary for recall or recognition (Johnson, 1983); (c) Some students acquire the necessary strategies through basic instructional methods, while others require very specific instruction in order to produce a summary of a text (Brown and Day, 1981).

The research we are discussing today examines the summarization strategies elementary school children employ when asked to construct summaries of expository text. The theoretical framework we have been using derives from theories of text processing that emphasize the notion that summarization involves making various decisions about the relative importance of different pieces of information in the text and about the relationships between those pieces of information. These decisions are discussed in the theories in terms of generalization, integration and construction rules.

According to Kintsch and van Dijk (1978), generalization involves the coordination of nominal or verbal elements that originally appear in different text statements. Integration involves selecting a statement from the text that encompasses the information contained in a number of statements. For example, the statement Sally made a candle encompasses the more specific actions involved in making it--actions that were also spelled out in the text such as She put a piece of string in a cup and poured melted wax into the cup. She let it harden and then took the candle out of the cup. Construction is similar to integration in its function. The difference involves whether the encompassing statement appeared in the text originally or whether the summarizer is supplying it. So in the previous example, if Sally made a candle had not appeared in the text but appeared in the summary of it, this would be construction rather than integration. The other important decision that must be made concerns what information to delete from the presented text in order to produce a summary. It appears that one thing the majority of children do learn about summaries is that they are supposed to be shorter than the original text. Thus, some of the original must be left out of the summary.

There have been two previous and major research efforts to examine what children do when they summarize text. Johnson (1983) examined story summarization and Brown and Day (1981) examined expository text summarization. With story texts, Johnson (1983) found evidence of shorter summaries than recalls of the stories from first grade on. However, she also found that the content of the summaries reflected the use of different strategies across the age range tested--first, third, fifth graders and adults. The changes she observed are similar to those observed by Brown and Day (1981) in expository text. We will describe the strategies identified by Brown and Day, since these are the ones with which we have been working.

In a series of experiments with students at the 5th, 7th, 10th and college grade level, Brown and Day (1981) examined the use of the deletion, generalization, integretion and construction rules previously illustrated. Brown and Day referred to the series of strategies shown in the middle column of Table 1. These strategies reflect the operation of the rules discussed by Kintsch and van Dijk (1978), shown in the left column of Table 1. For example, Brown and Day use selection strategy to refer to a situation in which a sentence that originally appeared in the text and encompassed a number of details appears in the summary. Invention refers to coming up with such a sentence when one did not appear in the text. Their major findings were that the copy-delete and superordination strategies were applied rather well by all age groups. Age differences were observed in the use of the selection and of the invention strategies, with older subjects using these more often than younger. However, the invention strategy was found to be applied only rarely even by college students. Brown and Day concluded that the copy-delete and superordination strategies

may require fewer processing resources than the selection and invention strategies.

We reasoned that any factor affecting the processing load might therefore affect the set of strategies a particular child might use in constructing a summary. In both of our experiments we manipulated two such factors: readability level of the the text and length of the summary the subject was asked to produce. As length of a summary decreases, those strategies thought to involve higher processing load become more appropriate. There is one additional point about testing summarization skills. If you want to know about the development of summarization skills separate from the development of memory skills, one must insure that all subjects know the text equally well. In order to achieve this Brown and Day did not begin the summarization task until each subject had memorized the text to a criterion level. They had to eliminate certain subjects who did not reach this criterion in the allotted number of trials and there were, not surprisingly, more eliminations at the younger than at the older levels. We have addressed the summarization-memory issue somewhat differently. We allow the children to have the texts in front of them while they dictate what they want in their summaries to the experimenter. Not only does this allow us to avoid eliminating subjects, but summarization with a text present is more typical of school summarization tasks.

In selecting passages for use in a summarization task, we first examined a number of upper-elementary level science and social studies texts. We were particularly interested in being able to predict what type of summarization strategy would be appropriate for the particular content. We therefore conducted two experiments using passages with different content structures. The first experiment involved the use of passages with a

description content structure in which each statement in each of two paragraphs gives examples of a general claim made in the topic sentence of the paragraph. An example is shown in Table 2. The topic sentence provided superordinate phrases for the noun phrases and for the verb phrases of each of the two paragraphs within the passage. We also presented these passages without the topic sentences but with an additional detail statement. For a child to invent an appropriate topic sentence in a summary they would be essentially using the generalization rule, providing their own superordinates for the noun and verb phrases. In a second experiment, we used a different type of content structure that we hypothesized would make invention somewhat more difficult. Passages with a Thesis/evidence content structure were presented, again with or without topic sentences. As can be seen from the sample on the right side of Table 2, the topic sentence provides a conclusion for the details stated in each of the paragraphs. Each detail supports the topic sentence in a "because" role. Inventing topic sentences in this case involves inferring the thesis of each paragraph and of the entire passage. We expected this to be more difficult than for the Experiment 1 passages.

Thus, in the Description/example passages, we could examine whether or not children invented a topic sentence when it required superordination; in the Thesis/evidence passages, when a conclusion had to be drawn. Manipulation of the presence or absence of the topic sentence allowed the examination of the developmental relationship between selection and invention strategies. Processing demands were manipulated by readability level: each group received texts at and two years below their grade level, as measured by the Fry readability formula. Fourth and sixth grade students partici-

pated in each experiment, with each student receiving one passage in the four presence-absence by readability conditions. Finally, by asking the subjects to form successively shorter summaries, the appropriateness of the various strategies changed and we could examine developmental differences in responding to this. Subjects were first asked to summarize each paragraph in two or three sentences; then summarize each paragraph in one sentence; and finally to summarize the entire text in one sentence.

In order to describe the strategies used by the subjects, we examined each statement in each of the three summary lengths for each condition. We developed a set of scoring categories that describe the relationship between the presented text and the statements that appear in the various summaries. These categories are shown in the far right hand panel of Table 1. The categories are reflective of different strategies that people might be using to decide on what to include in the summary. For example, the first category, copy detail, refers to cases in which detail statements were copied directly from the presented text. Such behavior reflects a copy-delete strategy, i.e., the subject is picking some details to include and others to delete from the summary. This is a relatively unsophisticated strategy. Somewhat more sophisticated behaviors are reflected by the Combine details categories. Details from the same or from the two paragraphs could be combined into one statement, typically by coordinating noun or verb phrases. These categories reflect use of the generalization rule or of the superordination strategy: combining details within one or across two paragraphs. The next two categories deal with selection and invention strategies. The selection strategy is reflected by copying a topic sentence from one of the paragraphs. Note that this strategy was possible

only in the topic sentence present condition. The corresponding behavior for the topic sentence absent condition is to generate a topic sentence. Including a topic sentence that encompasses information from both paragraphs reflects invention in both present and absent conditions since topic sentences for the entire selection were never presented. The selection and invention strategies are the most sophisticated of the summarization strategies we have examined. The remaining category is difficult to interpret in terms of a strategy: providing one or two words that serve as a title for the paragraph or for the entire passage. In one sense this reflects a higher level of superordination than combining details, but in another sense it may be a less sophisticated, labelling behavior.

We have done a variety of analyses on these data. Today, we will focus on only one: the dominant behaviors exhibited by each age group at each summary length. We present the results collapsed across readability and presence-absence conditions but we will be noting where these factors affected the behaviors.

Table 3 shows the categories occurring at each summary length for each grade level for the Description/example structure. Only categories that occurred with a frequency significantly greater than 0 are reported. When subjects are asked to summarize each paragraph in 3 or 4 sentences, the behaviors manifested by both fourth and sixth graders are similar. For both groups the dominant behavior is to copy detail sentences from the paragraphs. However, the fourth graders use the copy detail behavior more frequently than do the sixth graders ($z = 2.04$) and the sixth graders combine details within a paragraph more often than do the fourth graders ($z =$

3.28). Of greater importance is the finding that only the sixth graders generated topic sentences for one paragraph at this summary length. Furthermore, they tended to do this more often for texts below their readability level than for those at level.

At summary length 2, subjects were asked to provide one sentence for each paragraph. The dominant behavior for the fourth graders remained copy detail while the sixth graders increased their selection and invention behaviors by copying or generating topic sentences for one paragraph. Thus, in moving from length 1 to 2, the fourth graders show little evidence of changing strategies while the sixth graders shift to strategies that allow them to convey a better sense of the information in the whole text. Further, sixth graders showed this shift about equally for both passages with and without topic sentences. There was a somewhat greater tendency among the fourth graders to shift away from copying details in the topic sentence present condition as compared with the absent condition. Note that Readability level affected only the sixth graders' tendency to generate topic sentences: this was again more likely for the below-level texts than for the at-level texts.

The behaviors at summary length 3 reflect the same sort of developmental contrasts present at summary length 2: the sixth graders' dominant behavior was to generate a topic sentence for the entire passage. Thus, when asked to provide a summary for both paragraphs in one sentence, the sixth graders appropriately invent a general topic sentence that encompasses information in both paragraphs. This occurred at both readability levels and for both topic sentence present and absent conditions. The fourth graders however, did this only 33% of the time and equally often

picked out one detail sentence. The shift away from copying details was greater in the topic sentence present conditions regardless of readability level. Thus, in only one-third of the cases did fourth graders provide an appropriate one sentence summary of the entire passage.

The behaviors at the three summary lengths for the Thesis/evidence content structure are shown in Table 4. The behaviors observed at each summary length and the proportions in each category replicate the general trends observed with the first content structure. Sixth graders shift to the more appropriate selection and invention strategies to a greater degree than the fourth graders. For the fourth graders, the less sophisticated copy delete strategy showed the greatest likelihood in the assumed hardest condition, i.e., topic sentence absent, at-level readability at all three summary lengths. For the sixth graders, readability tended to have little effect on the behaviors at any summary length. Topic sentence affected only summary length two behaviors: the shift away from a copy-delete strategy was greater if topic sentences were in the passages.

In general, the distributions of behaviors and the inferred age changes in strategy use indicate that the younger fourth graders persisted in a "copy statements from the text approach" even when such "summaries" do not adequately convey the whole idea of the text. The sixth graders were more responsive to the changes in summary lengths and used more generalizing statements than details as the summaries got shorter. The pattern of readability and topic sentence effects are consistent with the notion that selection and invention stragegies require a higher processing load than copy-delete and superordination strategies.

References

Bloom, Benjamin. Taxonomy of educational objectives: Handbook I. Random House Inc. New York: 1964.

Brown, A. L., & Day, J. D. Strategies and knowledge for summarizing texts: The development and facilitation of expertise. Unpublished manuscript, April, 1981.

Guszak, Frank J. Diagnostic reading instruction in the elementary school. New York: Harper & Row Publishers, 1977.

Johnson, Nancy J. What do you do if you can't tell the whole story? The development of summarization skills. In K. E. Nelson (Ed.), Children's language (Vol. 5). New York: Gardner Press, 1983.

Kintsch, W. On comprehending stories. In M. A. Just & P. A. Carpenter (Eds.) Cognitive processes in comprehension. Hillsdale, N. J.: Erlbaum, 1977.

Kintsch, W & van Dijk, T. A. Toward a model of text comprehension and production. Psychological Review, 1978, 85, 363-394.

Strang, R. The contribution of structural linguistics to the teaching of reading, writing and grammar in the elementary school. Indiana University, Bulletin of the School of Education. January, 1974.

Table 1

Rules for Summarizing Text (Kintsch & van Dijk, 1978)	Strategies for Summarizing Text (Brown & Day, 1981)	Categories used in Present Study to Capture Relationship between Presented Text and Summaries
Deletion	Copy-delete	Copy detail sentence
Generalization	Superordination	Combine details a. within one paragraph b. across 2 paragraphs
Integration	Selection	Copy topic sentence that appeared in the presented text
Construction	Invention	Generate topic sentence a. for one paragraph b. for entire passage
	* Labelling	Copy or generate title a. for one paragraph b. for entire passage

* A strategy found in our study. Also note that generated topic sentences might reflect operation of the generalization rule.

Table 2

Samples of the passages used in the two experiments

Description-"Example of" Content Structure

Birds

The beaks of birds are fitted to find different foods. (A woodpecker's beak is fitted for drilling into trees.) A pigeon's beak is fitted to pick up seeds. A pelican's beak is shaped to hold several fish. A duck scoops things up from the water with its bill. A hawk's beak is fitted for tearing animal flesh. A sandpiper pokes in the sand for food with its beak. A hummingbird's beak is fitted for dipping into flowers. The sparrow cracks seeds with its tough, blunt beak.

The feet of birds are adapted to use in certain ways. (The feet of an ostrich help when the ostrich walks on the sand.) A hawk's feet are fitted for holding onto a branch. The hawk also holds on to rocky cliffs with its feet. A duck swims with its feet. The feet of a chicken are suited for scratching. Roadrunners have feet fitted for swift running. The quail scratches for food with its feet. A crane has feet to stand in shallow water.

Thesis/Evidence Content Structure

Pollution

We must control air pollution. (Plants don't grow well in polluted air.) Soot from dirty air makes thick dust in peoples' homes. Some older people get very ill from air pollution. Kids can't play outside when there is high pollution. Gas in polluted air makes your eyes hurt. The smell of polluted air is awful. Air pollution spreads very fast. More lights are used because of darkness caused by pollution.

We have to stop polluting our water resources. (Fish from dirty water can make us sick.) Polluted water kills fish and plants. Insects may spread germs from dirty ponds. No one can swim in polluted water. Polluted rivers and lakes are ugly to look at. The scum and filth cause awful odors. Pollution in the ocean will cause environmental problems. Some campgrounds are closed because of polluted water.

Underlined sentences are topic sentences included in the Topic Sentence-Present versions. Sentences in parentheses are the detail sentences included in the Topic Sentence-Absent versions in order to equate the lengths of the present/absent passages.

Table 3

Description--"Example of" Passages Summary Behaviors

Summary Length 1: 3 or 4 sentences for each paragraph

Fourth Grade		Sixth Grade	
Copy detail	.58	Copy detail	.42
Copy topic sentence from a paragraph	.28	Copy topic sentence from a paragraph	.23
Combine details within 1 paragraph	.04	Combine details within 1 paragraph	.18
Title for one paragraph	.04	Generate a topic sentence for one paragraph	.09

Summary Length 2: 1 sentence for each paragraph

Fourth Grade		Sixth Grade	
Copy detail	.52	Copy topic sentence from a paragraph	.32
Copy topic sentence from a paragraph	.28	Copy detail	.22
Generate a topic sentence for one paragraph	.09	Combine details within one paragraph	.21
		Generate a topic sentence for one paragraph	.20

Summary Length 3: 1 sentence for entire passage

Fourth Grade		Sixth Grade	
Copy detail	.34	Generate topic sentence for entire passage	.60
Generate topic sentence for passage	.33	Copy topic sentence for one paragraph	.16
Copy topic sentence for one paragraph	.18		
Title passage	.10		

Table 4

Thesis/Evidence Structure Summary Behaviors

Summary Length 1: 3 or 4 sentences for each paragraph

Fourth Grade		Sixth Grade	
Copy detail	.6	Copy detail	.37
Copy topic sentence from 1 paragraph	.24	Combine details within 1 paragraph	.27
Combine details within 1 paragraph	.11	Copy topic sentence from a paragraph	.16
		Generate topic sentence for one paragraph	.08

Summary Length 2: 1 sentence for each paragraph

Fourth Grade		Sixth Grade	
Copy detail	.55	Copy topic sentence from a paragraph	.27
Copy topic sentence from a paragraph	.19	Combine details within a paragraph	.23
Combine details within 1 paragraph	.16	Copy detail	.21
		Generate a topic sentence for one paragraph	.17

Summary Length 3: 1 sentence for entire passage

Fourth Grade		Sixth Grade	
Generate topic sentence for a passage	.33	Generate topic sentence for a passage	.59
Copy detail	.25	Combine details across 2 paragraphs	.19
Combine details across 2 paragraphs	.15	Copy topic sentence for one paragraph	.05
Copy topic sentence from a paragraph	.1	Copy detail	.05